
Cytokines and CNS development.

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Public Summary:

Cytokines are proteins best known for facilitating communication between cells of the immune system. Many of these same cytokines also act as signaling molecules between the cells in nonimmune organs such as the nervous system. As a consequence of this dual role, cytokines induced in response to maternal infection or certain perinatal complications can profoundly impact nervous system development. The neurodevelopmental impact of modulating the signaling of individual cytokines is being investigated in animal models. In this review, we outline these studies and discuss how their findings set the foundation for ongoing and future work aimed at understanding how cytokines induced normally and pathologically during critical stages of fetal development influence nervous system function and behavior later in life.

Scientific Abstract:

Cytokines are pleiotropic proteins that coordinate the host response to infection as well as mediate normal, ongoing signaling between cells of nonimmune tissues, including the nervous system. As a consequence of this dual role, cytokines induced in response to maternal infection or prenatal hypoxia can profoundly impact fetal neurodevelopment. The neurodevelopmental roles of individual cytokine signaling pathways are being elucidated through gain- and loss-of-function studies in cell culture and model organisms. We review this work with a particular emphasis on studies where cytokines, their receptors, or components of their signaling pathways have been altered in vivo. The extensive and diverse requirements for properly regulated cytokine signaling during normal nervous system development revealed by these studies sets the foundation for ongoing and future work aimed at understanding how cytokines induced normally and pathologically during critical stages of fetal development alter nervous system function and behavior later in life.

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